EU-NORSEWIND - Delivering Offshore Wind Speed Data

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EU - NORSEWInD
Delivering Offshore Wind Speed Data

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Introduction

In 2008 the EC programme NORSEWInD kicked off with a mission to deliver high quality offshore wind speed data for the wind industry. The aim of the project is to deliver offshore wind speed data to the wind industry using a multi-disciplinary, multi-instrument approach to build up the largest existing dataset of offshore wind speed data.

Offshore wind is the major growth area in the wind industry sector today, with a host of large projects being announced and innovative approaches being proposed. However, with all this investment and innovation there remains a key, fundamental missing element - a thorough understanding of the offshore wind climatology and likely wind resource.

As the wind industry starts to look in detail at the wind regime offshore, the need for more physical data becomes apparent.

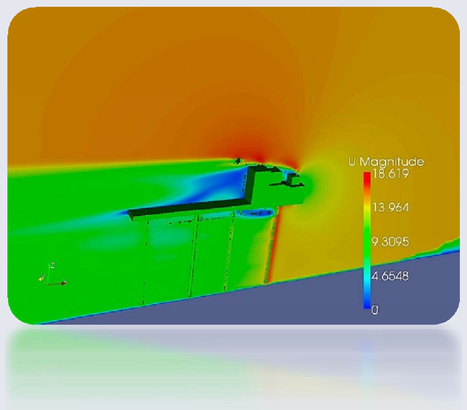
As well as the normal AEP requirements for project finance, baseline data is required in order to better understand the local conditions with respect to shear and hence loading implications, and of equal concern directionality which can feed into important research areas such as offshore wake propagation. Indeed, a good baseline understanding of the wind flow regime is essential in being able to determine the accumulative impact of large scale wind farms in relatively concentrated geographical areas.

NORSEWInD has a clear remit, the delivery of offshore wind speed data at a nominal project hub height acquired in offshore locations.

The project will use a multi-instrument approach, combining mast technology, LiDAR remote sensing and satellite based observations to compile a large and novel wind speed dataset suitable for use in the wind industry. The data will also feed into key areas such as forecasting and MESOSCALE modelling improvements.

The result is a large database accessible via a web based interface utilising GIS, that contains vital information for our understanding of this highly complex wind regime, and working environment.

Year 1 – Flow Modeling

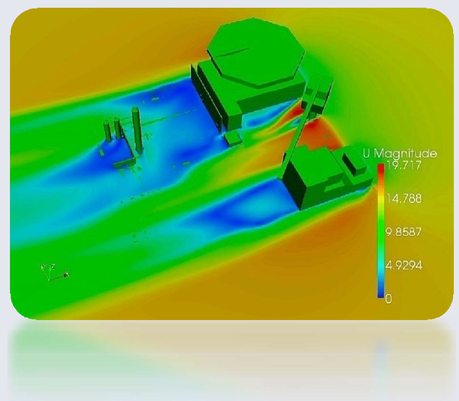


The primary installation location for the RS systems will be Oil Rig installations operated by Oil & Gas sector companies.

As the Rigs are generally large structures, the NORSEWInD team identified flow distortion, and the need to quantify the potential influence in Results. This is encapsulated in Work Task 3.2

The output from this work task is used to assess the likely influence of the flow modification from the rig on the flow and its likely influence on the flow reported from the LiDAR systems.

Special consideration will be given to the flow distortion across the conical scan volume of the systems, and it potential influence on the output. If the output is deemed to be significantly biased, then the CFD will be used to modify the output in a similar manner to [6].

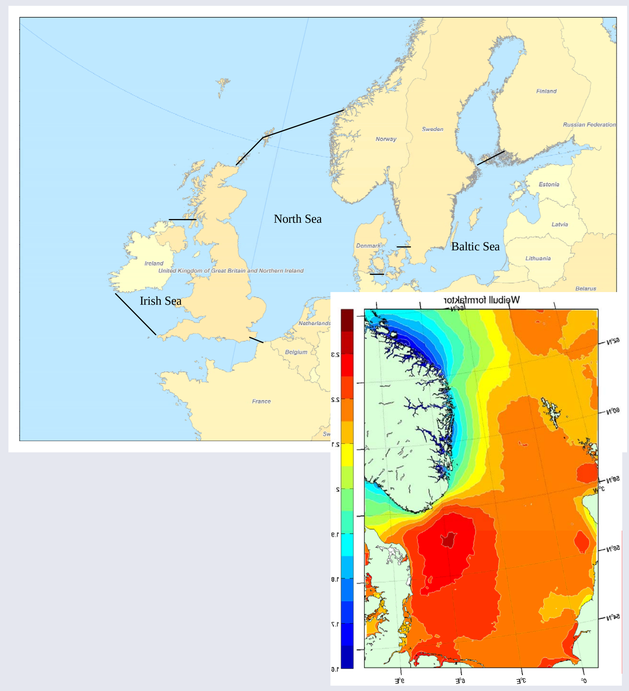


Acknowledgements: M Stickland; T Scanlon; S Fabre – University of Strathclyde

Year 2 - Objectives

In year 2, NORSEWInD will start the formal data acquisition process, combining satellite, LiDAR and Mesoscale modelling to create the most comprehensive offshore wind speed database currently available.

Key further work is in the important area of offshore shear , and continued work on flow modification and the integration of different satellite sources to increase data coverage, and reduce uncertainty.

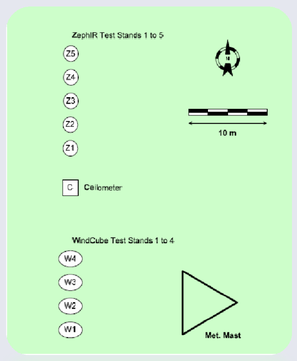


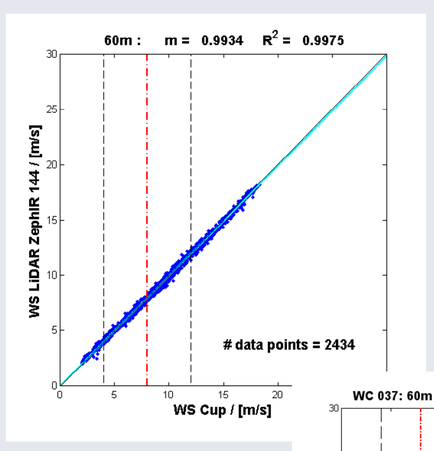
Acknowledgements: E Berge; O Bjyrkjedal – Kjeller Vindteknikk

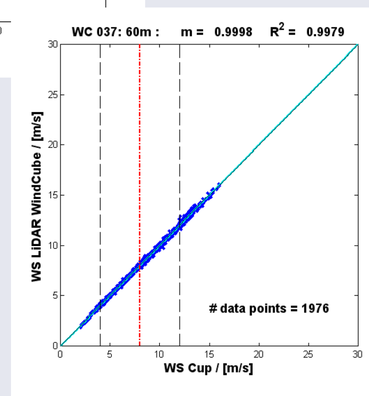
Year 1 - LiDAR Validation

Remote sensing is a key component of the NORSEWInD process, embracing current commercial LiDAR systems from Leosphere [1],Natural Power[2], Catch the Wind [3], as well as SoDAR systems from AQ Systems[4].

For the ground based systems to be accepted, a test programme was conceived and presented at EWEC 2009 in Marseille[5].







The objective was to create a replicable test programme that can ascertain the relative accuracy of the remote sensing systems, with all systems being hosted by and tested at the DTU RISOE facility at Høvsøre in Denmark.

To date the programme has tested 4 ZephIR systems and 4 Wind Cube systems prior to acceptance on the programme.

The figures to the left represent typical system output.

The NORSEWInD programme is the 1st standardised test for wind energy use, applied to 8 systems.

Acknowledgements: D Kindler WINDTEST Kaiser-Wilhelm-Koog
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NORSEWInD in Stockholm

- **WIND STATISTICS OFFSHORE BASED ON SATELLITE IMAGES**
  Charlotte Hasager et al – Monday 14th 16:00-17:30 Wind Resource Assessment
- **EU-NORSEWIND – ASSESSMENT OF VIABILITY OF OPEN SOURCE CFD CODE FOR THE WIND INDUSTRY**
  Matt Stickland et al - Monday 14th 16:00-17:30 Wind Resource Assessment
- **EU-NORSEWIND – INVESTIGATION OF FLOW DISTORTION EFFECTS ON OFFSHORE INSTRUMENTATION**
  Matt Stickland et.al – PO.125
- **PRE-DEPLOYMENT VALIDATION OF VARIOUS WIND LIDAR REMOTE SENSING DEVICES AND SUCCESSIVE OFFSHORE DEPLOYMENTS ON OIL AND GAS RIGS IN THE NORTH SEA FOR A 2 YEAR OFFSHORE WIND MEASUREMENT CAMPAIGN**
  D Kindler et al – PO.114

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2. Natural Power ZephIR - http://www.naturalpower.com/zephir-laser-anemometer
3. Catch the Wind Vindicator - http://www.catchthewindinc.com/products/vindicator
4. AQ Systems AQ500 - http://www.aqs.se/index.htm
5. Kindler, D; Courtney, M.; Oldroyd A: **Testing and calibration of various LiDAR remote sensing devices for a 2 year offshore wind measurement campaign**. Scientific track EWEC 2009;march. Marseille
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